

11/17/99
Jc682 U.S. PTO

FISH & RICHARDSON P.C.

225 Franklin Street
Boston, Massachusetts
02110-2804

Telephone
617 542-5070

Facsimile
617 542-8906

Web Site
www.fr.com

Jc525 U.S. PTO
09/442347

11/17/99

Fredrick P. Fish
1855-1930

W.K. Richardson
1859-1951

November 17, 1999

Attorney Docket No.: 00216-468001

Box Patent Application

Assistant Commissioner for Patents
Washington, DC 20231

Presented for filing is a new original patent application of:

Applicant: Harold Rand Thompson and Gordon Gerald Guay

Title: **HAND-HELD PRODUCT DISPENSERS HAVING PRESSURIZED DELIVERY**

Enclosed are the following papers, including those required to receive a filing date under 37 CFR 1.53(b):

	Pages
Specification	7
Claims	5
Abstract	1
Declaration	[To be Filed at a Later Date]
Drawing(s)	4

Enclosures:
— Postcard.

Basic filing fee	\$760
Total claims in excess of 20 times \$18	\$810
Independent claims in excess of 3 times \$78	\$390
Fee for multiple dependent claims	\$260
Total filing fee:	\$2220

CERTIFICATE OF MAILING BY EXPRESS MAIL

Express Mail Label No. EL245451955US

I hereby certify under 37 CFR §1.10 that this correspondence is being deposited with the United States Postal Service as Express Mail Post Office to Addressee with sufficient postage on the date indicated below and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Date of Deposit November 17, 1999
Signature *[Signature]*
Typed or Printed Name of Person Signing Certificate *E. I. Avenbaum*

BOSTON
DELAWARE
NEW YORK
SILICON VALLEY
SOUTHERN CALIFORNIA
TWIN CITIES
WASHINGTON, DC

FISH & RICHARDSON P.C.

Assistant Commissioner for Patents

November 17, 1999

Page 2

A check for the filing fee is enclosed. Please apply any other required fees or any credits to deposit account 06-1050, referencing the attorney docket number shown above.

If this application is found to be incomplete, or if a telephone conference would otherwise be helpful, please call the undersigned at (617) 542-5070.

Kindly acknowledge receipt of this application by returning the enclosed postcard.

Please send all correspondence to:

WILLIAM E. BOOTH
Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804

Respectfully submitted,



William E. Booth
Reg. No. 28933
Enclosures
WEB/lrg

APPLICATION
FOR
UNITED STATES LETTERS PATENT

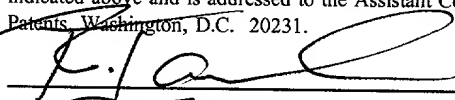
TITLE: **HAND-HELD PRODUCT DISPENSERS HAVING PRESSURIZED DELIVERY**

APPLICANT: **HAROLD RAND THOMPSON AND GORDON GERALD GUAY**

"EXPRESS MAIL" Mailing Label Number EL245451955US

Date of Deposit November 17, 1999

I hereby certify under 37 CFR 1.10 that this correspondence is being deposited with the United States Postal Service as "Express Mail Post Office To Addressee" with sufficient postage on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.



R. T. A. C. W. B. A. U. M.

HAND-HELD PRODUCT DISPENSERS HAVING PRESSURIZED DELIVERY

BACKGROUND OF THE INVENTION

The invention relates to hand-held product dispensers having pressurized delivery.

Various products have been conveniently dispensed in a pressurized form from a hand-held container such as a spray can. Typically a push button on top of the can is depressed to actuate a valve that provides an open path from the material in the container to a spray nozzle on the push button that directs the pressurized material in a direction that is perpendicular to the push button direction. This push button type of mechanism is often used for antiperspirant, deodorant and shaving cream dispensers.

Alternatively, some valves are actuated by providing a tilt (sideways push) action to an elongated tubular nozzle that directs the product along the axis of the can. Such valves are often employed in whipped cream dispensers.

SUMMARY OF THE INVENTION

In one aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container that is movable with respect to the container to cause pressurized discharge of the product, and a valve actuation lever that is connected to the valve mechanism and extends along the container body. With this arrangement, a larger displacement of the end of the lever causes a controlled, relatively smaller displacement of the valve mechanism, permitting adjustable, "throttled" delivery of the product.

In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation lever that extends along the container body. The product dispenser also includes a product delivery member that is attached to the top of container and has a product holding structure that is positioned with respect to the valve mechanism to receive product and to hold the product in position for application.

Preferred embodiments of the invention may include one or more of the following features. The product holding structure can take a variety of forms to assist in applying product. For example, it can have a generally flat upper surface or an arcuate surface. The product holding structure can be a porous structure having pores that receive the product.

5 The product holding structure can be an elastomeric applicator. The product holding structure can be a sintered structure. The product holding structure can have a textured surface. The product holding structure can have a grid surface.

10 In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation member that has a hand-engageable portion that extends along the container body. The valve mechanism is movable away from the container to discharge the product, and the valve actuating member is connected to move the valve mechanism away from the container as the hand-engageable portion is moved toward the body portion of the container.

15 In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation member that is made of plastic and has a hand-engageable portion that extends along the container body and is pivotally connected with respect to the container via a living hinge.

20 In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation member that has a hand-engageable portion that extends along the container body. The valve actuation member has a pivot end that is pivotally connected with respect to the container and also has a valve engaging portion that engages the valve mechanism and is located between the pivot end and the hand-engageable portion. Alternatively the pivot can be located between the valve engaging portion and the hand-engageable portion.

25 In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation member that has a hand-engageable portion that extends along the container body. The hand-engageable portion of the valve actuation member has a first cam member that faces the container, and the container carries a second

cam member that faces the first cam member. The first and second cam members are oriented such that, as the hand-engageable portion is moved toward the container, interaction of the first and second cam surfaces causes the valve actuating member to move downward to actuate the valve mechanism.

5 In another aspect, the invention features, in general, a hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container, and a valve actuation member that has a hand-engageable portion that extends along the container body. The container carries a movable stop member that faces the hand-engageable portion so as to limit travel of the hand-engageable portion toward
10 the container. The stop member has different portions that are selectively movable into position facing the hand-engageable portion so as to adjust movement of the valve actuating member.

The dispensers can be used to dispense various products such as a shaving aid, an antiperspirant, a deodorant, a body spray, after shave lotion, hair spray, a liquid, a semi-solid,
15 a gel, a cream or a powder. The container can be an aerosol container, a container having a product bag inside a pressurized chamber, or another type of container providing pressurized delivery of product.

Embodiments of the invention may include one or more of the following advantages. The throttling permitted by the actuation lever allows the user to employ different types of
20 sprays ranging from a fine mist to a hard spray. The side location of the actuation lever promotes accuracy in directing the product. The consumer has more control over product application and has the ability to personalize the application experience. The side location of the actuation lever also improves ergonomics. With the product holding structure on the container top, the user need not apply certain products to his or her hands prior to applying
25 the products to the skin or hair.

Other advantages and features of the invention will be apparent from the following description of particular embodiments thereof and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

30 FIG. 1 is a plan view, with a cap component in section, of a product dispenser.

FIG. 2 is an elevation, with a cap component in section, of the FIG. 1 product dispenser.

FIG. 3 is a perspective view, with a cap component in section, of the FIG. 1 product dispenser.

5 FIG. 4 is a plan view, with a cap component in section, of an alternative embodiment of a product dispenser.

FIG. 5 is an elevation, with a cap component in section, of the FIG. 4 product dispenser.

10 FIG. 6 is a perspective view, with a cap component in section, of the FIG. 4 product dispenser.

FIG. 7 is a perspective view of modified cap and nozzle components of the FIG. 4 product dispenser with the nozzle in a retracted position.

FIG. 8 is a perspective view of the FIG. 7 cap and nozzle components with the nozzle in an extended position.

15 FIG. 9 is a perspective view, with a cap component in section, of a further alternative embodiment of a product dispenser.

FIG. 10 is an elevation, with a cap component in section, of a further alternative embodiment of a product dispenser.

20 FIG. 11 is an elevation, with a cap component in section, of a further alternative embodiment of a product dispenser.

FIG. 12 is a plan view of an adjustable-stop ring component useful with the FIG. 11 dispenser.

FIG. 13 is a plan view of an alternative embodiment of an adjustable-stop ring component useful with the FIG. 11 dispenser.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1-3, spray dispenser 10 includes aerosol container 12, having valve mechanism 14 of the type that is actuated by depression of nozzle 16, which directs the spray axially, unlike the typical finger-actuated push-button nozzle, which directs the spray radially. The majority of valve mechanism 14 is located inside container 12 at the top; a

suitable valve mechanism, e.g., is the type used in commercial Right Guard antiperspirant dispensers. Dispenser 12 also includes a plastic cap 18, attached to the top of container 12, and valve actuation lever 20, which pivots at pivot end 22 underneath cap 18. Lever 20 includes upper portion 24, which extends along the interior upper surface of cap 18 and is
5 connected to a lower portion of nozzle 16. Lever 20 also includes angled portion 28, which extends through opening 30 in cap 18, and hand-engaging portion 32, which extends along the body of container 12.

When using dispenser 10, the user holds the container in his or her hand, and squeezes hand-engaging portion 32 toward container 12, which results in a smaller
10 downward depression of nozzle 16, owing to the longer moment arm at portion 32 than at nozzle 16. This permits the user to throttle and adjust the flow rate of the delivery of product from nozzle 16. The different types of sprays that can be employed range from a fine mist to a hard stream. The side location of actuation lever 20 improves ergonomics (reducing the extent of wrist deflection needed for actuation and use), and promotes accuracy in directing
15 the product in addition to controlling the amount of product being dispensed. The consumer thus has more control over product application and has the ability to personalize the application experience. Dispenser 10 could also be used to dispense creams or gels under pressure, using either propellant or internal bladder technology (e.g., available from Sepro).

Referring to FIGS. 4-6, dispenser 40 is similar to dispenser 10 in that it includes
20 container 12, cap 18, axially directed nozzle 42 and side actuation lever 44. Dispenser 40 differs from dispenser 10 in that nozzle 42 is actuated by extending it from container 12 (instead of depressing), and the pivot 46 for lever 44 is located between the end 48 connected to nozzle 42 and the hand-engaging portion 50, which extends along the body of container 12. With this arrangement, the product is dispensed with nozzle 16 extended above the upper
25 surface 52 of cap 18. The dispensed product can be collected on surface 52, and nozzle 16 can then be retracted during application of the product, e.g., to a user's skin.

Referring to FIGS. 7-8, modified cap 60 and nozzle 62 are shown. Nozzle 62 is in a retracted position in FIG. 7 and is in an extended, dispensing position in FIG. 8. Nozzle 62 has internal passageways 64 that direct the product to side openings 66, where the product is
30 dispensed laterally, to the upper surface 68 of cap 60 in the extended position shown in FIG. 8. Cap 60 and nozzle 62 are desirably used on container 40 of FIGS. 4-6. The product is collected on the upper cap surface 68 prior to application to a user's skin. Thus a shaver can

dispense and apply shaving cream without the need to put foam on his or her hands and without the need to rinse off the hands after applying the cream and prior to shaving. In addition, surface 68 can be provided with functional surfaces to provide efficacy, comfort or a combination of benefits. Surface 68 can be provided with a textured applicator. Surface 68 could be provided with flocked foam surface (e.g., available from TekPak in NJ and Claremont Flock Inc. of Claremont, NH). Alternatively, porous sintered domes, of the type employed in Narta deodorant cans, can also be used. Surface 68 can be flat, as shown, or arcuate. It could also be provided with a grid structure or elastomeric applicator.

Referring to FIG. 9, dispenser 80 is similar to dispenser 10, except that plastic lever 82 is integral with plastic cap 84. The upper end of lever 82 is pivotally connected to cap 84 at living hinge 86.

Referring to FIG. 10, dispenser 90 is similar to dispenser 10, except that it has the upper end of lever 20 pivotally connected to vertical support 92 instead of cap 94. Support 92 is attached to an upstanding circular structure on container 12 by ring 96. With dispenser 90, product can be dispensed with cap 94 on or with cap 94 off.

Referring to FIG. 11, dispenser 100 is similar to dispenser 90, except that it employs cam surface 102, on member 104 on container 12, and mating cam surface 106 on the inner side of hand-engaging lever portion 108 facing container 12. As hand-engaging portion 108 is squeezed toward container 12, surface 106 tends to slide downward (as well as inward) along surface 102, exerting a downward force in the lever 20 that assists in depressing valve 14 without requiring large angular movement of lever 20.

Referring to FIGS. 12 and 13, metering rings 110 and 120 are shown. Both rings 110, 120 are mounted on a respective container 12 aligned with, and inside of, a respective hand-engageable portion 108 of dispenser 100 shown in FIG. 11. Each ring 110, 120 has in internal portion 112, 122, respectively, which is fixedly secured on can 12, and an outer adjustable stop portion 114, 124, respectively, that can slide around fixed internal portion 112, 122, such that different areas can be aligned with the lever. On ring 110, stop portion 116 has the largest radius and acts as a lock, preventing any movement of lever 108. Stop portions 118 have different radii and permit different amounts of flow. On ring 120, the end 126 of stop portion 124 acts as a lock, while the remainder of stop portion 124 has a gradually decreasing radius, permitting selection of any stop position desired for movement of the hand-engageable portion 108.

With the large moment arms provided by the side levers, stronger springs can be employed in the valves. Stronger springs can enhance the throttle mechanism and have the added benefit of reducing propellant leakage owing to salt build-up around the valve's rubber gasket.

5 Other embodiments of the invention are within the scope of the appended claims.

Besides valves that are actuated by downward depression, valves with tilt actuation (e.g., as available from Summit Technologies, Manchester, NH under designation AX-11209 0.019 RT) can be used. In this case, the caps have oval or other shape openings that permit tilting of the nozzle.

10 What is claimed is:

15

20

25

30

1 1. A hand-held pressurized product dispenser comprising
2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,
4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container, and
7 a valve actuation lever that is connected to said valve mechanism and extends along
8 said body to a lever end such that relatively larger displacement of said lever end causes a
9 controlled, relatively smaller displacement of said valve mechanism, permitting adjustable
10 delivery of said product.

1 2. A hand-held pressurized product dispenser comprising
2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,
4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container,
7 a product delivery member attached to said top of said container and having a product
8 holding structure that is positioned with respect to said valve mechanism to receive said
9 product, and
10 a valve actuating member that is connected to actuate said valve and has a hand-
11 engageable portion that extends along said body.

1 3. A hand-held pressurized product dispenser comprising
2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,
4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container, and
7 a valve actuating member that is connected to actuate said valve and has a hand-
8 engageable portion that extends along said body portion,

9 said valve mechanism being movable away from said container to discharge said
10 product,

11 said valve actuating member being connected to move said valve mechanism away
12 from said container as said hand-engageable portion is moved toward said body.

1 4. A hand-held pressurized product dispenser comprising
2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,
4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container, and

7 a valve actuating member that is connected to actuate said valve and has a hand-
8 engageable portion that extends along said body,

9 said valve actuating member being made of plastic and being pivotally connected
10 with respect to said container via a living hinge.

1 5. A hand-held pressurized product dispenser comprising
2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,

4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container, and

7 a valve actuating member that is connected to actuate said valve and has a hand-
8 engageable portion that extends along said body,

9 said valve actuating member having a pivot end that is pivotally connected with
10 respect to said container and also having a valve engaging portion that engages said valve
11 mechanism and is located between said pivot end and said hand-engageable portion.

1 6. A hand-held pressurized product dispenser comprising

2 a container containing product under pressure, said container having a top, a hand-
3 engageable body portion and a bottom,

4 a valve mechanism at the top of said container that communicates with said container
5 and is movable with respect to said container to cause pressurized discharge of said product
6 out of said container, and

a valve actuating member that is connected to actuate said valve and has a hand-engageable portion that extends along said body,

said valve actuating member having a valve engaging portion that engages said valve mechanism and a pivot that pivotally connects said valve actuating member with respect to said container and is located between said valve engaging portion and said hand-engageable portions.

7. A hand-held pressurized product dispenser comprising

a container containing product under pressure, said container having a top, a hand-engageable body portion and a bottom,

a valve mechanism at the top of said container that communicates with said container and is movable with respect to said container to cause pressurized discharge of said product out of said container, and

a valve actuating member that is connected to actuate said valve and has a hand-engageable portion that extends along said body,

said valve actuating member having a first cam member that is connected to said hand-engageable portion and faces said container,

said container carrying a second cam member that faces said first cam member,

said first and second cam members being oriented such that, as said hand-engageable portion is moved toward said container, interaction of said first and second cam surfaces causes said valve actuating member to move downward to actuate said valve mechanism.

8. A hand-held pressurized product dispenser comprising

a container containing product under pressure, said container having a top, a hand-engageable body portion and a bottom,

a valve mechanism at the top of said container that communicates with said container and is movable with respect to said container to cause pressurized discharge of said product out of said container, and

a valve actuating member that is connected to actuate said valve and has a hand-engageable portion that extends along said body,

said container carrying a movable stop member facing said hand-engageable portion so as to limit travel of said hand-engageable portion toward said container, said stop member having different portions that are selectively movable into position facing said hand-engageable portion so as to adjust movement of said valve actuating member.

1 9. The dispenser of claim 8 wherein said stop member has stepped portions, each
2 with a different radius.

1 10. The dispenser of claim 2 wherein said product holding structure has a generally
2 flat upper surface.

1 11. The dispenser of claim 2 wherein said product holding structure has a generally
2 arcuate upper surface.

1 12. The dispenser of claim 2 wherein said product holding structure is a porous
2 structure having pores that receive said product.

1 13. The dispenser of claim 2 wherein said product holding structure is an elastomeric
2 applicator.

1 14. The dispenser of claim 2 wherein said product holding structure is a sintered
2 structure.

1 15. The dispenser of claim 2 wherein said product holding structure has a textured
2 surface.

1 16. The dispenser of claim 2 wherein said product holding structure has a grid
2 surface.

1 17. The dispenser of claim 1, 3, 7 or 8 further comprising a product delivery member
2 that is attached to said top of said container and has a product holding structure that is
3 positioned with respect to said valve mechanism to receive said product,

1 18. The dispenser of claim 1 wherein said valve actuation lever is made of plastic
2 and is pivotally connected with respect to said container via a living hinge.

1 19. The dispenser of claim 4 further comprising a cap on said container, and wherein
2 said valve actuating member is integral with said cap.

1 20. The dispenser of claim 18 wherein further comprising a cap on said container, and
2 wherein said valve actuation lever is integral with said cap.

1 21. The dispenser of claim 1 wherein said valve actuation lever has a pivot end that is
2 pivotally connected with respect to said container and also having a valve engaging portion
3 that engages said valve mechanism and is located between said pivot end and said hand-
4 engageable portion.

1 22. The dispenser of claim 1 wherein said valve actuation lever has a valve engaging
2 portion that engages said valve mechanism and a pivot that pivotally connects said valve

3 actuating member with respect to said container and is located between said valve engaging
4 portion and said hand-engageable portion.

1 23. The dispenser of claim 7 wherein said container carries a movable stop member
2 facing said hand-engageable portion so as to limit travel of said hand-engageable portion
3 toward said container, said stop member having different portions that are selectively
4 movable into position facing said hand-engageable portion so as to adjust movement of said
5 valve actuating member

6 said container carrying a movable stop member facing said hand-engageable portion
7 so as to limit travel of said hand-engageable portion toward said container, said stop member
8 having different portions that are selectively movable into position facing said hand-
9 engageable portion so as to adjust movement of said valve actuating member

1 24. The dispenser of claim 1, 2 or 3 wherein said product is a shaving aid.

1 25. The dispenser of claim 1, 2 or 3 wherein said product is an antiperspirant.

1 26. The dispenser of claim 1, 2 or 3 wherein said product is a deodorant.

1 27. The dispenser of claim 1, 2 or 3 wherein said product is a body spray.

1 28. The dispenser of claim 1, 2 or 3 wherein said product is a gel.

1 29. The dispenser of claim 1, 2 or 3 wherein said product is a cream.

1 30. The dispenser of claim 1, 2 or 3 wherein said product is a semisolid.

1 31. The dispenser of claim 1, 2 or 3 wherein said product is a liquid.

1 32. The dispenser of claim 1, 2 or 3 wherein said product is an after shave.

1 33. The dispenser of claim 1, 2 or 3 wherein said product is a hair spray.

1 34. The dispenser of claim 1, 2 or 3 wherein said product is a powder.

1 35. The dispenser of claim 1, 2 or 3 wherein said container is an aerosol container.

1 36. The dispenser of claim 1, 2 or 3 wherein said container has a product bag inside a
2 pressurized chamber.

ABSTRACT OF THE INVENTION

A hand-held pressurized product dispenser that includes a container with a hand-engageable body portion, a valve mechanism at the top of the container that is movable with respect to the container to cause pressurized discharge of the product, and a valve actuation lever that is connected to the valve mechanism and extends along the container body such that a larger displacement of the end of the lever causes a controlled, relatively smaller displacement of the valve mechanism, permitting adjustable "throttled" delivery of the product. Also disclosed are: a product delivery member that is attached to the top of container and has a product holding structure that is positioned with respect to the valve mechanism to receive product and to hold the product in position for application; cam members are oriented to cause the valve actuating lever to move downward as it is moved toward the container body; and a movable stop member that is carried on the container and faces the hand-engageable portion so as to limit travel of the hand-engageable portion toward the container.

20005280.doc

T-670

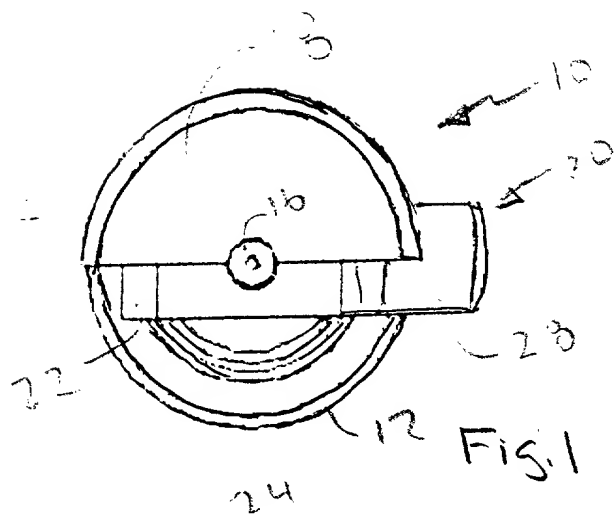


FIG. 1

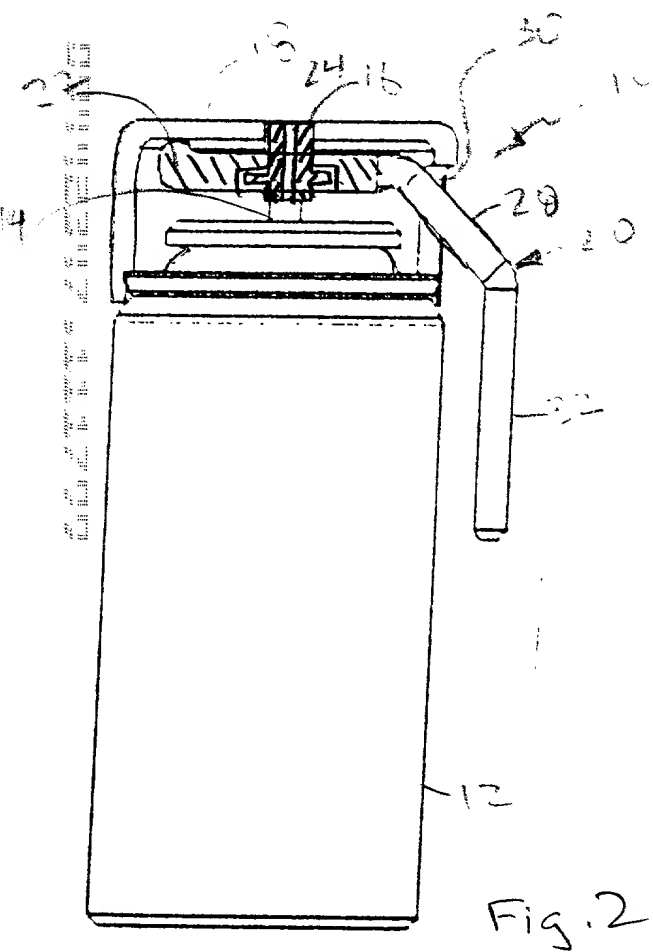


FIG. 2

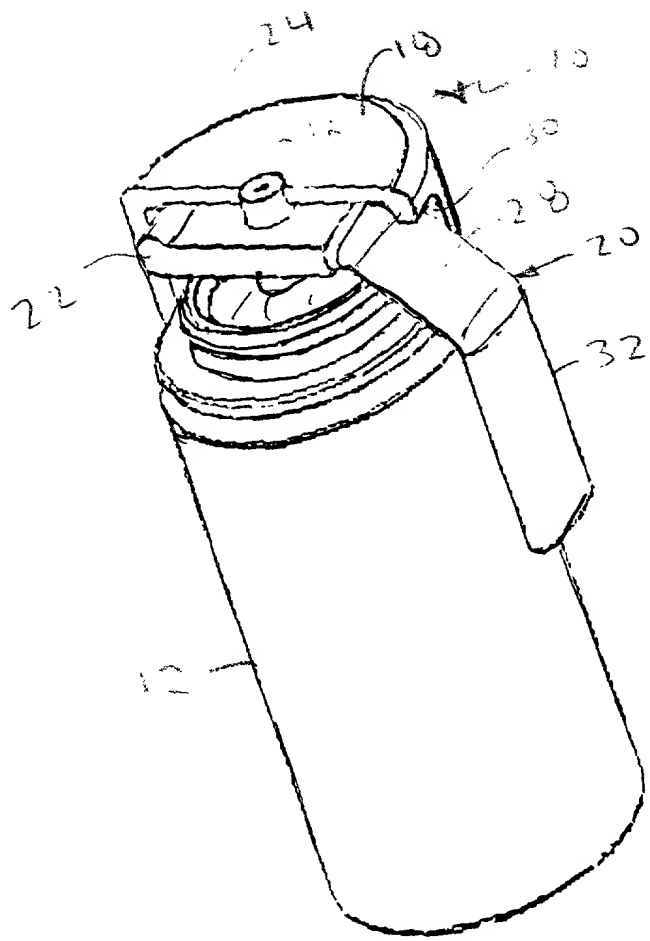


FIG. 3

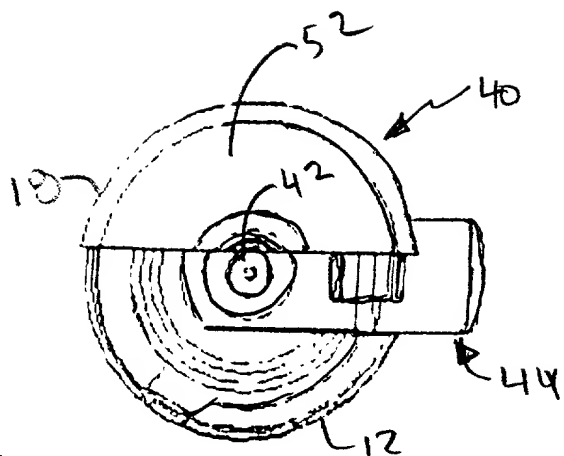


FIG. 41

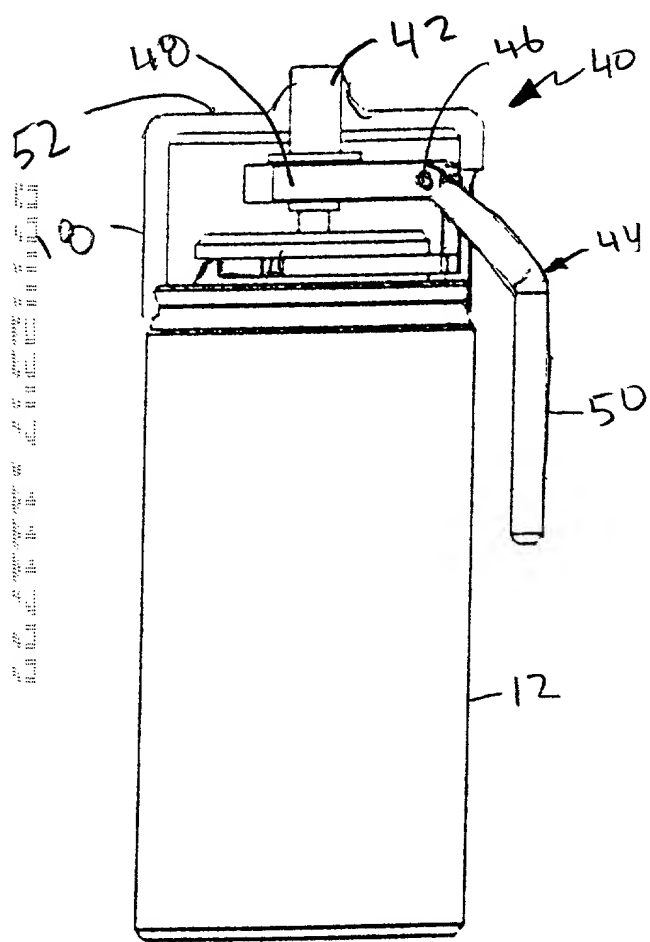


FIG. 5

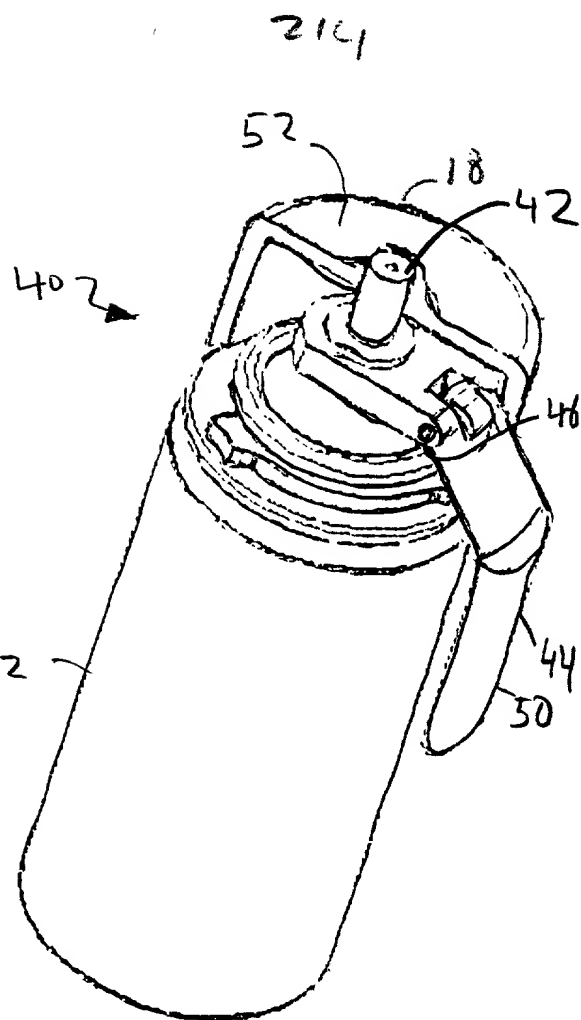


FIG. 6

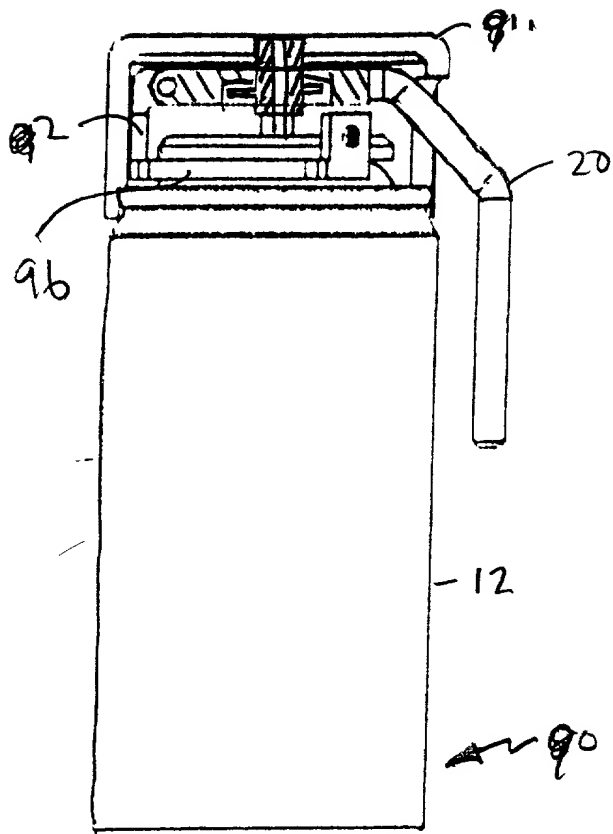


Fig. 6. 90

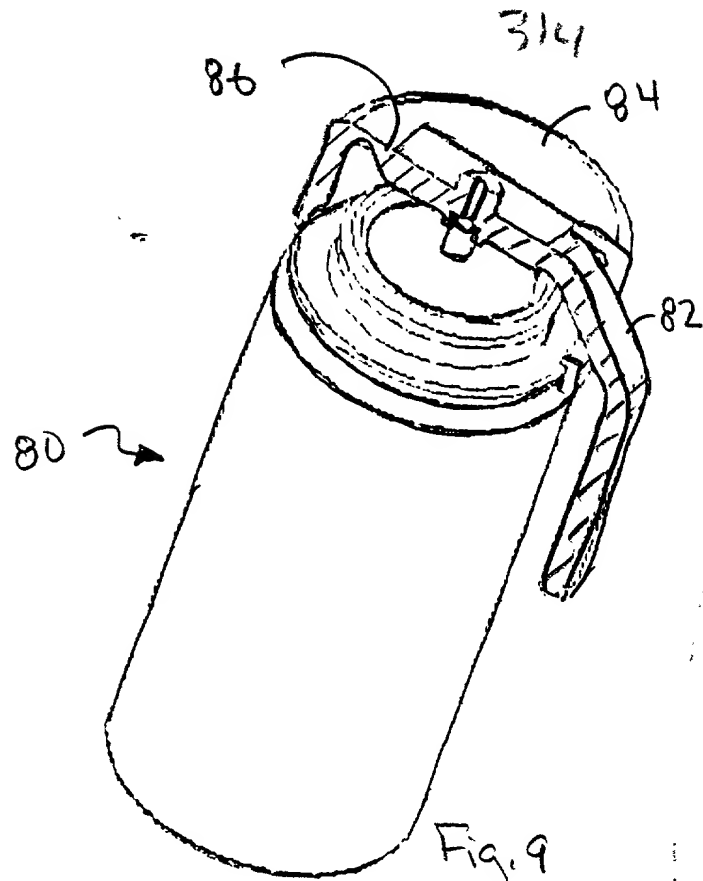


Fig. 9

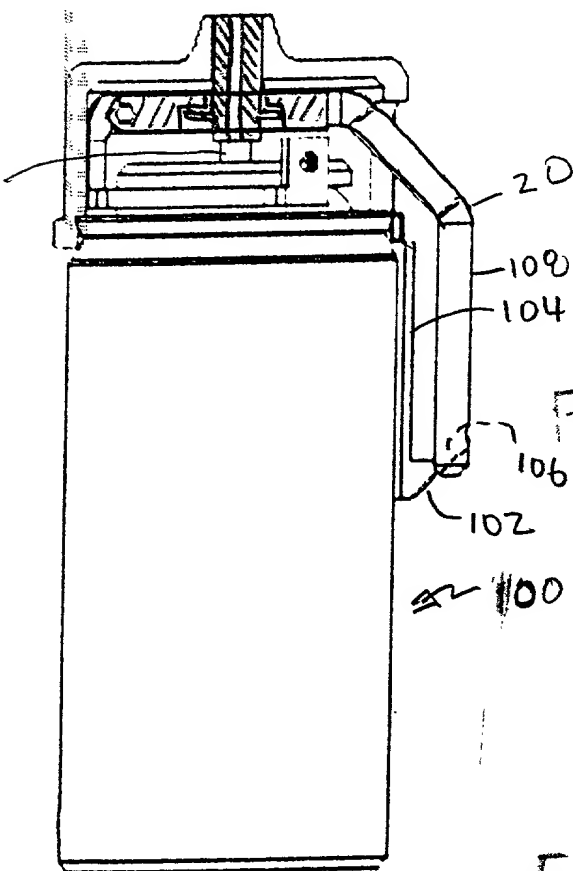


Fig. 10

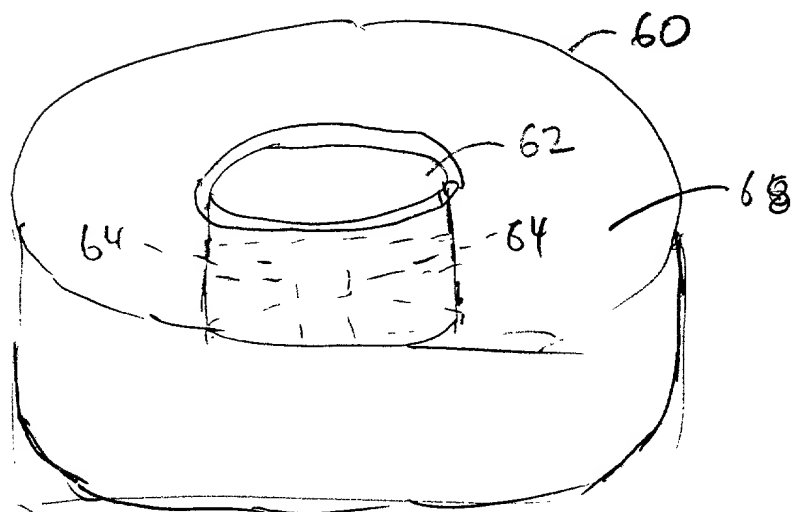


Fig. 7

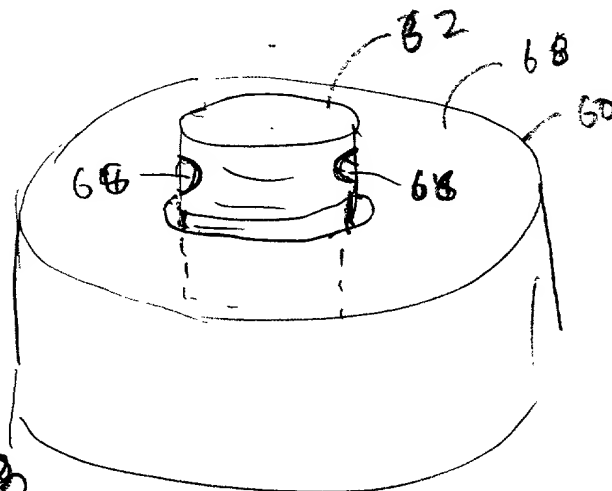


Fig. 8

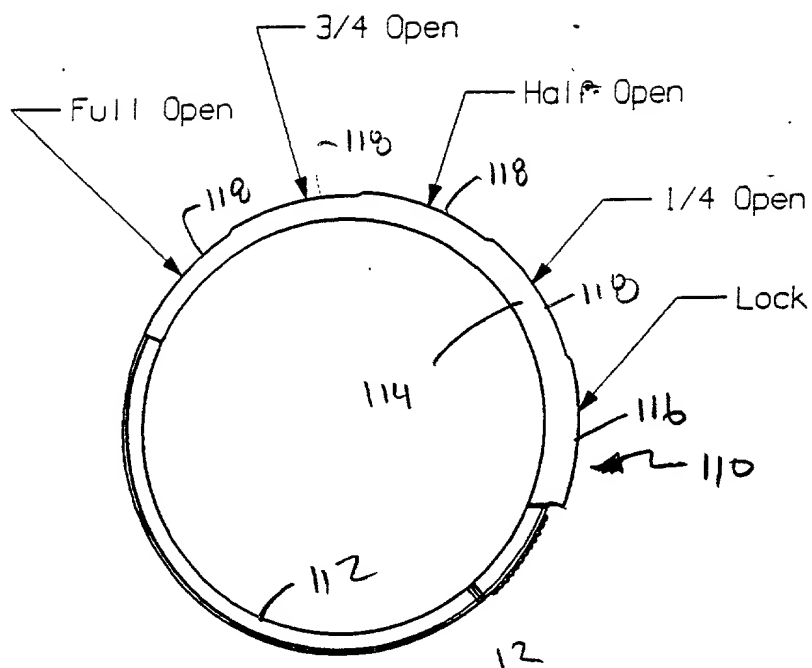


FIG. 12

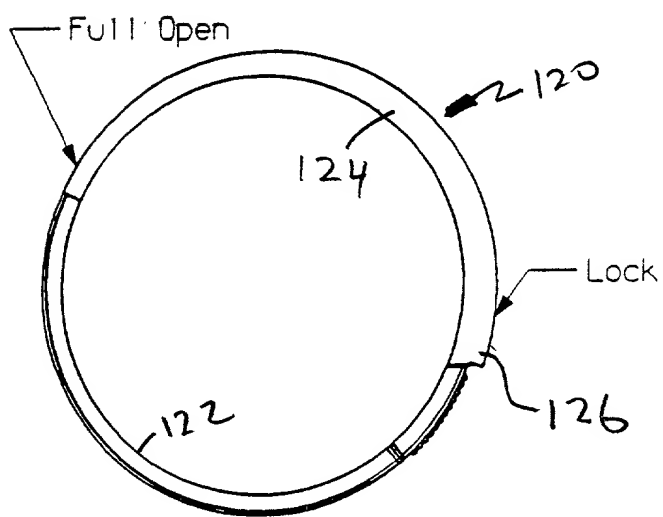


FIG. 13

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled HAND-HELD PRODUCT DISPENSERS HAVING PRESSURIZED DELIVERY, the specification of which

☒ is attached hereto.

☐ was filed on _____ as Application Serial No. _____
and was amended on _____.

☐ was described and claimed in PCT International Application No. _____
filed on _____ and as amended under PCT Article 19 on _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: William E. Booth, Reg. No. 28,933

Address all telephone calls to William E. Booth at telephone number 617/542-5070.

Address all correspondence to William E. Booth, Fish & Richardson P.C., 225 Franklin Street, Boston, MA 02110-2804.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full Name of Inventor: Harold Rand Thompson

Inventor's Signature: _____ Date: _____

Residence Address: 54 Green Street, Norwell, Massachusetts 02061

Citizen of: U.S.A.

Post Office Address: 54 Green Street, Norwell, Massachusetts 02061

COMBINED DECLARATION AND POWER OF ATTORNEY CONTINUED

Full Name of Inventor: Gordon Gerald Guay

Inventor's Signature: _____ Date: _____

Residence Address: 18 Regina Drive, Chemsford, Massachusetts 01824

Citizen of: U.S.A.

Post Office Address: 18 Regina Drive, Chemsford, Massachusetts 01824